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(12) United States Patent

McCune et al.

(54) FLEXIBLE SUPPORT STRUCTURE FOR A GEARED ARCHITECTURE GAS TURBINE ENGINE

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This patent is subject to a terminal dis-

claimer.

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(58) Field of Classification Search

None

See application file for complete search history.

(56) References Cited

U.S. PATENT DOCUMENTS

3,287,906 A 3,754,484 A 11/1966 McCormick 8/1973 Roberts (Continued)

FOREIGN PATENT DOCUMENTS

CA 2789325 4/2013 CA 2789465 4/2013 (Continued)

OTHER PUBLICATIONS

International Preliminary Report on Patentability for International Application No. PCT/US2013/060105 mailed on Apr. 2, 2015.

(Continued)

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(57) ABSTRACT

A geared architecture for a gas turbine engine according to an exemplary aspect of the present disclosure includes, among other things, a fan shaft, a frame which supports the fan shaft, the frame defines a frame stiffness and a plurality of gears which drives the fan shaft. A flexible support defines a flexible support stiffness that is less than the frame stiffness. The plurality of gears are supported by at least one of a carrier and the flexible support and an input coupling to the plurality of gears, the input coupling defines an input coupling stiffness with respect to the frame stiffness.

27 Claims, 8 Drawing Sheets

